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Cont

21. ~~(Now)~~ A slidable member as claimed in Claim 15, wherein the surface section of said hard carbon-based film is in slidable contact with an opposite member in presence of the lubricating oil between the hard carbon-based film and the opposite member.

REMARKS

Applicants acknowledge receipt of an Office Action dated October 23, 2001. By way of reply, Applicants have cancelled claims 1, 13 and 14 and have added new claims 15-21. In addition, Applicants have amended claims 2-8 and 11 so that they depend from claim 15. Support for these amendments may be found in the specification at, for example, the last paragraph of page 3; page 5, lines 16-19; Figure 4; and page 16 in its entirety. Claims 2-8, 10-12, and 15-21 now are pending in the application.

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and the remarks which follow.

I. Rejections Under 35 U.S.C. §102(e)

Claims 1-8 and 10-12 stand rejected under 35 U.S.C. §102(e) as being anticipated by Sho (USP 5,843,571). Of these, claims 10 and 12 are independent (claim 1 has been cancelled). The remaining rejected claims depend from new claim 15. To the extent that the PTO maintains this rejection against the presently pending claims, applicants traverse the rejection for at least the following reasons.

New claim 15 defines a slidable member in combination with lubricating oil in contact with the slidable member. The slidable member has a hard carbon-based film coated on a surface of a substrate. The hard carbon-based film has a surface section which contains at least one of nitrogen and oxygen in an amount ranging from 0.5 to 30 at%. Claims 10 and 12, as amended, define a slidable member used with lubricating oil.

Because the slidable member of claims 10, 12, and 15 is in contact with lubricating oil, the surface section of the hard carbon-based film can be in slidable contact with an opposite member, such as a cam, with lubricating oil between the surface section of the hard carbon-based film and the member. Oiliness agents contained in lubricating oil can be physically or chemically adsorbed at the surface of

the hard carbon-based film since a large number of polar groups are present at the surface of the hard carbon-based film. As a result, the hard carbon-based film can have low friction characteristics and, in particular, can exhibit a low coefficient of friction, μ , of not more than 0.07.

By comparison, Sho discloses a slidable member of a mechanical part. The slidable member includes an amorphous hard carbon film deposited on a substrate. Although Sho, in Test Example 2, discloses subjecting a film to "a wear test in a HFC-134a + PAG oil with a high pressure friction test machine," the oil referenced by Sho does not appear to be a lubricating oil. Thus, Sho fails to teach the combination of the hard carbon based film with lubricating oil, as recited in each of independent claims 10, 12 and 15, and fails to disclose the advantages attained by the present invention, such as the film's low coefficient of friction. For at least this reason, Applicants respectfully request reconsideration and withdrawal of the §102(e) rejection based upon Sho.

New claim 16 defines a system that includes a lubricating oil in contact with a slidable member. New claim 17 defines a valve operating system that includes lubricating oil present between a surface section of a hard carbon-based film of an adjusting shim and a cam. New claim 18 defines a slidable member used with lubricating oil. Each of claims 16-18 requires the presence of lubricating oil. Accordingly, Applicants submit that new claims 16-18 are patentable over Sho for at least the same reasons as claims 10, 12, and 15.

II. Rejections Under 35 U.S.C. §102(b)

Claims 1-8 and 10-12 stand rejected under §102(b) as being anticipated by Dorfman *et al.* (USP 5,466,431) or Itoh (USP 5,190,824) or Yamamoto *et al.* (USP 4,783,368) or Kokai *et al.* (USP 4,755,426). Applicants respectfully traverse this rejection to the extent that it may be applied against the pending claims in the application.

As explained above, each of independent claims 10, 12, and 15-18 recites "lubricating oil". Specifically, each of claims 10, 12, and 18 recite "[a] slidable member used in contact with lubricating oil...". Claim 15 recites "a slidable member in combination with lubricating oil...". Claim 16 recites "[a] system comprising...lubricating oil...", and claim 17 recites "[a] valve operating system comprising...lubricating oil...".

Since none of Dorfman *et al.*, Itoh, Yamamoto *et al.*, or Kokai *et al.* disclose lubricating oil as recited in each of independent claims 10, 12, 15, 16, 17 and 18, the PTO has failed to meet its burden in establishing a proper anticipation rejection. For at least this reason, applicants request reconsideration and withdrawal of the §102(b) rejections.

CONCLUSION

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested. The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

2. (Twice Amended) A slidable member as claimed in Claim **15** [1], wherein said hard carbon-based film is a diamond film formed by a chemical vapor deposition process.

3. (Twice Amended) A slidable member as claimed in Claim **15** [1], wherein the surface section of said hard carbon-based film contains at least one of nitrogen and oxygen in an amount ranging from 4 to 20 at%.

4. (Twice Amended) A slidable member as claimed in Claim **15** [1], wherein said hard carbon-based film has a surface roughness lower than 0.1 μm .

5. (Twice Amended) A slidable member as claimed in Claim **15** [1], wherein said hard carbon-based film has a hardness Hv higher than 1000.

6. (Twice Amended) A slidable member as claimed in Claim **15** [1], wherein said hard carbon-based film has a thickness ranging from 1 to 10 μm , wherein said hard carbon-based film has a coefficient of friction of not higher than 0.07 in a condition where said hard carbon-based film is dipped in a lubricating oil.

7. (Twice Amended) A slidable member as claimed in Claim **15** [1], wherein said substrate is formed of a material selected from the group consisting of silicon nitride and steel.

8. (Twice Amended) A slidable member as claimed in Claim **15** [1], wherein said hard carbon-based film is formed of a material selected from the group consisting of diamond polycrystal, amorphous carbon, and diamond like carbon.

11. (Twice Amended) A slidable member as claimed in Claim **15** [1], wherein said hard carbon-based film is formed by one of a carbon ion beam process, a thermal chemical vapor deposition process, an ion plating process, and a sputtering process.